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STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

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July 8, 1998

Mr. Jackson Kinzer
U.S. Department of Energy
P.O. Box 550, MSIN: S7-50
Richland, WA 99352

Mr. Anthony Umek
Fluor Daniel Hanford, Incorporated
P.O. Box 1000, MSIN: S7-40
Richland, WA 99352

Ms. Mary Delozier
Lockheed Martin Hanford Corporation
P.O. Box 1500, MSIN: H7-07
Richland, WA 99352

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Dear Messrs. Kinzer, Umek, and Ms. Delozier:

Re: Notice of Correction Resulting from Dangerous Waste Compliance Inspection at SY Tank Farm, Conducted March 24, 1998

Thank you for the assistance of the U.S. Department of Energy (USDOE), Fluor Daniel Hanford Company (FDH), and Lockheed Martin Hanford Corporation (LMHC) personnel during the Washington State Department of Ecology's (Ecology) recent inspection of the SY Tank Farm.

Findings from this inspection include the following violations of Washington Administrative Code (WAC) chapter 173-303 Dangerous Waste Regulations and Code of Federal Regulations (CFR). These violations reflect serious deficiencies in the operation of SY tanks; however, the corrective measures described below provide for remedy of these violations without suspending operations of the DST system. A number of concerns resulting from Ecology's inspection of the SY Tank Farm have also been identified and listed below.

VIOLATIONS:

#1) 40 CFR Subpart J, 265.191, Assessment of existing tank system's integrity by reference of WAC 173-303-400, Interim Status Facility Standards.

USDOE, FDH, and LMHC failed to provide an assessment of the integrity of the 244-S Double Contained Receiver Tank (DCRT) per 40 CFR 265.191.

Lack of integrity assessment for the 244-S DCRT was reported by USDOE to Ecology by letter dated July 8, 1995, in response to a request by Ecology's Assistant Director, Dan Silver, to identify non-compliant conditions at the Hanford Site. Resolution of such non-compliant items became known as "Silver list" items. USDOE's July 8, 1995, response to the Silver list item regarding tank integrity assessments (including the 244-S DCRT) referred to Tri-Party Agreement (TPA) Milestone M-32 as the means to correct non-compliant conditions within the double shell tank system. A DST Transfer Facility Compliance Plan (WHC-SD-WM-EV-094) was developed by USDOE and its contractors as one component of M-32 in meeting regulatory requirements for compliant operation of the DST system. This Transfer Facility Compliance Plan exempted the 244-S DCRT from upgrades stating this tank system would not be used beyond completion of transfer facility upgrades. The DST Part B Dangerous Waste Permit Application also states the 244-S DCRT would not be used after transfer facility upgrades had been completed. As a result of this understanding, USDOE and its contractors have not performed integrity assessments of the 244-S DCRT. However, the 244-S DCRT supports transfers of single shell tank waste and 222-S laboratory waste streams and will be used into the foreseeable future (20 to 30 years). Therefore, integrity assessments of the 244-S DCRT are required per 40 CFR 265.191.

#2) 40 CFR Subpart J, 265.193, Containment and detection of releases by reference of WAC 173-303-400, Interim Status Facility Standards.

USDOE, FDH, and LMHC failed to provide a leak detection system designed and operated to detect the failure of either the primary and secondary containment structure of double-walled tanks SY-101, SY-102, and SY-103 within 24 hours per 40 CFR 265.193(c)(3) and specifically 40 CFR 265.193 (e)(3)(iii). The leak detection system for SY tanks includes annulus continuous air monitors, annulus fixed conductivity probes, annulus adjustable conductivity probes, and annulus leak detection pits. Each of these components is deficient as follows:

The following deficiencies are associated with the design and operation of continuous air monitors (CAMs) for use as leak detectors to detect failure of the primary structure of SY double-walled tanks:

- *Annulus leak detector CAM alarm set points are set to alarm at values unrelated to detection of leaks.*
- *No documentation for deriving baseline values on which to base annulus CAM leak detection readings and alarm set points has been provided. Notwithstanding lack of baseline data, annulus CAM recorder data from January, 1997 through March, 1998 references a baseline value for each SY tank; however, this data is inconsistent with the baselines presented.*
- *No evaluation of the use of CAMs for leak detection in Hanford tanks has been performed (i.e. evaluations of annulus ventilation characteristics, waste volatility, particulate transport, CAM sampling efficiency, and compounding of error from all factors). However, a recent evaluation of air circulation within the annulus of DST AY-102 indicates disproportionate air circulation within the annulus of this tank with substantially less than 50% of actively ventilated air reaching the annulus bottom where a leak would accumulate. Also, a report titled "Double-Shell Tank Air Flows," SD-WM-TA-017, Rev. 0, 07/12/89, describes limitations of the use of CAMs as leak detectors. This report cites factors limiting the use of CAMs as leak detectors to include: locations and type of leak, particle size, wetness of waste matrix, velocity of annulus air flow, absorption of various particle sizes in concrete, and waste temperature. The report states that under near-optimum conditions, CAMs can detect small leaks; however, under other conditions, CAMs are less sensitive than other existing leak detection methods (visual inspections and conductivity probes).*
- *No procedure was in place for tracking or documenting accumulated radiological data from maintenance of annulus CAM filters at the time of Ecology's inspection.*
- *No original SY Tank Farm planning, design, or construction information provided to Ecology specified the use of CAMs as leak detectors in the SY tanks.*
- *"Technical Bases for the Leak Detection Surveillance of Waste Storage Tanks," WHC-SD-TI-573, Rev. 1, 02/21/95, advises that "Annulus CAMs are useful for qualitative indication of a leak only" and "The minimum size leak which could be detected by an annulus CAM is impractical to assess . . ."*
- *Since implementation of the Basis of Interim Operations (BIO) functional testing of CAMs has inexplicably decreased from monthly to every six months.*

The following deficiencies are associated with the design and operation of adjustable annulus conductivity probes as leak detectors to detect failure of the primary structure of SY tanks:

- *Annulus adjustable conductivity probe alarm set points are specified at unexplained (one [1] inch) high levels from the annulus floor.*
- *Annulus adjustable conductivity probes have been reset above their specified set point to deactivate alarms.*
- *No record was presented of when or why adjustable conductivity probes in SY-102 were raised above their specified set point in April and May 1997.*

- *SY tanks have only one adjustable conductivity probe per tank, whereas all other double shell tanks have three conductivity probes per tank, 120 degrees apart.*
- *Since implementation of the Basis of Interim Operations (BIO) functional testing of conductivity probes has inexplicably decreased from monthly to every six months.*

The following deficiencies are associated with the design and operation of fixed annulus conductivity probes as leak detectors to detect failure of the primary structure of SY tanks:

- *During Ecology's inspection, LMHC stated that SY tanks were constructed with only one adjustable conductivity probe in each SY tank. However, 241-SY Tank Riser Equipment Arrangement drawings for all SY tanks indicate each SY tank was originally equipped with three fixed conductivity probes. The legend on current drawings for the risers containing the fixed conductivity probe leak detectors states, "temperature and leak detector leads (leak detectors out of service)." LMHC could not provide information describing when or why these leak detectors were abandoned.. LMHC reported that fixed leak detector probes are currently in use in AY and AZ tanks.*

The following deficiencies are associated with the operation and maintenance of SY tanks' leak detection pits:

- *Leak detection pit sumps are overfilled and some dip tube systems are out of service. Equipment deficiency lists indicate that the radiation meters in some leak detection pits are out of service.*
- *Leak detection pits are part of original SY tank farm equipment for leak detection. USDOE advised Ecology, by letter dated September 26, 1996, that maintenance of leak detection pits for double shell tanks would be discontinued. USDOE's letter states that since annular leak detection systems meet regulatory requirements, leak detection pits are redundant and no longer needed. Ecology has not formally concurred with discontinuing use of leak detection pits and the March 24, 1998, inspection of SY tank farm has revealed deficiencies in the annular leak detection system in SY tanks.*

#3) 40 CFR Subpart J, 265.193, Containment and detection of releases by reference of WAC 173-303-400, Interim Status Facility Standards.

USDOE, FDH, and LMHC failed to operate the secondary containment system of tanks SY-101, 102, and 103 so that it would be capable of removing waste from secondary containment within 24 hours, or in as timely a manner as is possible, per 40 CFR 265.193(c)(4).

- *Pumps, and their associated equipment for retrieving waste from the annuli of SY tanks, are not readily available.*

- *No procedures or plans for pumping SY tank annuli are in place.*

#4) 40 CFR Subpart J, 265.195, Inspections by reference of WAC 173-303-400, Interim Status Facility Standards and the requirements of WAC 173-303-320, General Inspections.

USDOE, FDH, and LMHC failed to develop an inspection schedule for all equipment that help prevent, detect, or respond to hazards to the public health or the environment per WAC 173-303-320(2)(d). USDOE, FDH, and LMHC failed to base inspection frequencies on the rate of possible deterioration of equipment per WAC 173-303-320(2)(c). USDOE, FDH, and LMHC failed to remedy problems revealed by inspections to prevent hazards to public health or the environment per WAC 173-303-320(3). USDOE, FDH, and LMHC failed to inspect data gathered from leak detection equipment to ensure the tank system is being operated according to its design per 40 CFR 265.195(a)(3).

- *Systems in place for documenting equipment deficiencies discovered through daily inspections and routine testing of monitoring equipment are poorly tracked or administered to ensure their repair.*
- *Daily inspections failed to detect that annulus conductivity probes had been reset above their established alarm set points.*
- *Daily rounds sheets contain a column for "normal range" values for various instrumentation within the SY tank farm; however, no normal range value is given on rounds sheets used prior to April 1998 for annulus CAM recorder readings. Rounds sheets in use after April 1998 specify a normal range value of <2000 cpm for annulus CAMs; however, this range does not correlate with the baseline ranges on CAM recorder data sheets or with the requirements of the technical basis for surveillance of tank farm leak detection equipment.*
- *Daily inspection implementing procedure TF-OR-WST-01-D, B-39 does not specify a normal range for annulus CAM readings.*
- *Leak detection monitoring equipment in SY tank leak detection pits were identified as requiring repair on SY tank farm equipment deficiency lists from September 1996 through February 1998. These equipment deficiencies have not been corrected.*
- *Reoccurring problems with SY annulus conductivity probe alarms were identified in the shift managers log throughout the spring of 1997. A work package to correct these problems was generated in March 1997 and has not been completed by the time of Ecology's inspection a year later (March 1998).*
- *Documentation for proper operation of leak detection and monitoring equipment is accomplished through routine functional tests, daily inspections, CASS alarm events, shift manager's log book entries, and an integrated work schedule. These various means of surveillance over leak detection equipment are not coordinated with an adequate means for documenting equipment deficiencies or ensuring follow-up and repair of deficient leak detection and monitoring equipment.*

#5) 40 CFR Subpart J, 265.195(c) Inspections; operating record by reference of WAC 173-303-400, Interim Status Facility Standards and the requirements of WAC 173-303-380, Recordkeeping.

USDOE, FDH, and LMHC failed to adequately document in the operating record the data gathered from leak detection monitoring equipment per 40 CFR 265.195(c) or to maintain these records at the facility per WAC 173-303-380(1).

- *Signed maintenance and functional testing records for SY tank leak detection equipment for the past five (5) years were not kept on-site.*
- *Computer generated copies of original SY tank leak detection maintenance and functional testing records were presented to Ecology as the required documentation per WAC 173-303-380)(1)(e); however, these computerized copies lacked the signature of the inspector and, in some cases, contained transposition errors from the original field inspection forms.*
- *Many records of leak detection equipment surveillance and maintenance were not readily available beyond one (1) year (not maintained on-site for five [5] years) or could not be located.*

CONCERNS:

#1) The document "Technical Bases for the Leak Detection Surveillance of Waste Storage Tanks" WHC-SD-TI-573, Rev. 1, 02/21/95, advises that annulus CAM filter papers are read on a weekly basis and states, "The presence of a markedly increased rate of activity buildup on the CAM filter paper is also a subjective indication of a leak." This procedure advises, "The presence of any long lived radionuclides or short lived daughter products not indicative of natural uranium decay indicates a possible leak into a DST annulus and must be investigated."

At the time of Ecology's inspection, annulus CAM filter paper readings were conducted every two (2) weeks without any written procedure, instructions, or documentation of CAM filter paper readings. No notification at specified action levels or comparison of previous readings to determine if a markedly increased level of activity buildup had occurred was performed. Leak detection monitoring for SY tanks should include clear specifications, direction, documentation, and notification per the technical bases for operation of this equipment.

#2) Review of the 1997 Annual Cathodic Protection Survey and bi-monthly (every two[2] months) inspections of rectifiers associated with cathodic protection systems for SY tank farm indicate that these inspections were successfully completed. However, Ecology understands that funding for continued monitoring and maintenance of the cathodic protection system is in jeopardy.

Annual surveys and bi-monthly inspections of cathodic protection systems are required by regulation and must be maintained.

#3) The authorization basis for SY tank farm referenced monitoring SY-101 waste surface level from data provided by a FIC installed in riser 1C. An ENRAF installed in riser 1A also provided surface level rise information for SY-101. The FIC in riser 1C was replaced by an ENRAF in December 1996.

Although ENRAFs have proven more reliable than FICs, surface level monitoring data for consideration of potential gas buildup within SY-101 was taken from the FIC in riser 1C throughout 1996. However, from June 1996 through January 1997, surface level monitoring data from the ENRAF in riser 1A indicated an increased rate of surface level rise while the instrumentation in riser 1C indicated a relatively steady surface level. For example, the ENRAF in riser 1A registered a surface level rise from 403 inches to 406 inches from June 1996 through January 1997, while the FIC in riser 1C indicated a rise of 399 inches to 400 inches for the same time period. Also, surface level readings from March through June 1996 indicate the FIC in riser 1C dropped while surface level readings from the ENRAF in riser 1A rose steadily. The cause for these divergent readings remains unexplained. However, once the FIC in riser 1C was replaced with an ENRAF in December 1996, the ENRAFs in risers 1A and 1C exhibited similar rates of surface level increase suggesting the FIC data from riser 1C was inaccurate.

Authorization basis notwithstanding, Ecology is concerned that pertinent, and potentially more reliable, data was not seriously considered prior to declaration of the USQ regarding the current surface level rise in SY-101. Ecology recommends that all monitoring instruments be considered when reviewing anomalous tank waste behavior.

#4) The Tank Advisory Panel recommended accurate liquid level measurements be obtained to provide the most reliable indication of gas retention in SY-101 waste.

The Tank Advisory Panel recommended that obtaining liquid level measurements within the waste of SY-101 should be a high priority in determining total gas retention in SY-101 sludge. Ecology recommends obtaining these measurements in as timely a manner as possible and is concerned with delays in obtaining this information. As of May 1, 1998, the surface level rise in SY-101 continued at a rate of .02 inches/day.

#5) Heat trace systems are provided for transfer lines within SY tank farms.

Preparations for receipt of waste into SY-102 from SX-104 in September 1997 did not include active heat trace of lines within the SY tank farm. The compatibility assessment for transfer of waste from SX-104 to SY-102 advises SX-104 waste must be agitated or maintained above 40

degrees centigrade to prevent line plugging; however, heat trace systems for transfer lines within SY tank farms are not operational.

#6) Review of report, "Double-Shell Tank Air Flows" SD-WM-TA-017, Rev. 0, 07/12/89.

The report, "Double-Shell Tank Air Flows" SD-WM-TA-017, Rev. 0, 07/12/89, investigated annulus air flows in the AY Tank Farm. This report also investigated leak detection capabilities of conductivity probes and CAMs in Hanford DSTs. The report compares DST leak detection in USDOE's Savannah River facility to Hanford DST leak detection capabilities.

Many of Ecology's current inspection findings regarding the limitation of leak detection systems in SY tanks are repeated in this report. Ecology is concerned that this previously available information regarding leak detection does not appear to have been incorporated in current leak detection systems in Hanford DSTs. Findings from this report regarding leak detection include the following:

- *Diverting annulus air flow to the bottom of the annulus would improve CAM sensitivity about 16 to 34 times. Other recommendations in this report for improving leak detection monitoring include: instituting a schedule of visual inspections of the annuli for leaks, testing of simulated waste solutions to quantify the ability of CAMs to detect a leak in various waste types, and testing of insulting concrete for waste absorption and retention.*

- *The report references discovery of eight (8) leaking DSTs in the Savannah River facility and compares leak detection in Savannah River tanks to leak detection in Hanford Facility tanks. Although the report states that CAMs provide significant leak detection system for DSTs, it states that of the eight (8) leaking DSTs discovered in Savannah River, five (5) were discovered by visual examination, two (2) by conductivity probes, and one (1) by CAMs. The report also recommends a number of limitations in the use of CAMs and recommends actions to improve their capability to detect a leak (see bullet above).*

  Factors limiting the use of CAMs as leak detectors include: locations and type of leak, particle size, wetness of waste matrix, velocity of annulus air flow, absorption of various particle sizes in concrete, and waste temperature. The report states that under near-optimum conditions, CAMs can detect small leaks; however, under other conditions, CAMs are less sensitive than other existing leak detection methods (visual inspections and conductivity probes).

- *The report states that visual inspections detected leaks before annulus conductivity probes in Savannah River tanks and recommends initiation of a systematic visual inspection program be considered for the Hanford Site.*

In order to correct the violations identified in this notice of correction, please complete the following corrective measures within the time frames specified. Please be advised that a penalty per Revised Code of Washington (RCW) 70.105.080 is pending regarding the failure by USDOE, FDH, and LMHC to provide adequate leak detection in SY tanks. Failure to correct the violations described in this letter may result in the issuance of an administrative order and/or additional penalties per RCW 70.105.080. A request for additional time to complete the corrective measures identified in the notice of correction must be in writing and received by me for consideration no later than July 28, 1998.

CORRECTIVE MEASURES:

Corrective Measure #1: Assessment of existing tank system's integrity.

Within thirty (30) days of receipt of this letter, USDOE, FDH, and LMHC must submit a schedule for completing the assessment of the integrity of the 244-S DCRT within calendar year 1998.

Corrective Measure #2: Containment and detection of releases.

Within thirty (30) days of receipt of this letter, USDOE, FDH, and LMHC must summarize the following in a written report to Ecology:

- All leak detection equipment currently in place for each of the twenty-eight (28) DSTs at Hanford. This report must include a description of the current operating condition of all annulus CAMs, fixed and adjustable conductivity probes, leak detection pits, and other devices used to detect leaks from the primary tank of each DST.
- Establishment and schedule for maintaining reference baselines for each annulus CAM used for leak detection purposes. Baselines must be derived from documented annulus CAM filter paper readings from each DST annulus leak detection CAM from at least the past twelve (12) months.
- Establishment of alarm set points for leak detection CAMs that are derived from baseline data specific to each CAM. The alarm set point must be no more than three (3) times the baseline value unless a higher value is technically defensible for accurately detecting a leak and is approved by Ecology.
- Establishment and schedule for maintaining three (3) conductivity probes used for leak detection purposes equally distributed around the annulus of each DST.
- Establishment and schedule for maintaining alarm set points for each adjustable conductivity probe at ¼ inch from the annulus floor of each DST unless a higher value is technically defensible for accurately detecting a leak and is approved by Ecology.

- A schedule describing how each DST will be operated by end of calendar year 1998 with continuous leak detection system capable of detecting a leak into the secondary containment of each DST within 24-hours. Given the limitations of each leak detection device currently in use, the leak detection system for each DST must include continuous monitoring with all of the following equipment: annulus CAMs, three (3) conductivity probes per tank placed equidistantly within each tank's annulus and functioning leak detection pits. Ecology will consider USDOE's proposed discontinuation of leak detection pits upon receipt of a written, technically defensible demonstration that annulus leak detection devices for each DST are sufficient for detecting a release from the primary tank of a DST within 24-hours per 40 CFR Subpart J 265.193(e)(3)(iii).

Corrective Measure #3: Containment and detection of releases.

Within thirty (30) days of receipt of this letter, USDOE, FDH, and LMHC must submit a report that describes the readiness to remove waste from the secondary containment of all DSTs within 24-hours. This report must:

- Identify all pumps and associated fittings needed to pump the secondary containment of each DST.
- Identify the location where all pumps and associated fittings needed to pump the secondary containment of each DST will be maintained.
- Identify all transfer routes to compliant storage and preparatory activities required to remove waste from the secondary containment of each DST.

Corrective Measure #4: Inspections.

Within thirty (30) days of receipt of this letter, USDOE, FDH, and LMHC must develop an inspection schedule for all DSTs that includes:

- Inspection of all data from leak detection equipment to ensure the tank system is operated according to its design. Inspections must include and document at a minimum that: (1) all leak detection equipment is set at established alarm set points, (2) equipment calibrations are current, (3) all leak detection supporting equipment is operational (i.e. proper air supply to CAMs, equipment cabinet temperatures are correct, etc.), (4) functional tests are performed at frequencies that ensure accurate continuous monitoring, and (5) that equipment deficiencies discovered through daily inspections are clearly described and documented.
- A clear means of tracking equipment deficiencies discovered through daily inspections.
- A clear means of tracking completion of repairs to equipment found deficient through daily inspections.

Corrective Measure #5: Facility Recordkeeping.

Within thirty (30) days of receipt of this letter, USDOE, FDH, and LMHC must specify the location on-site for retaining records of leak detection equipment inspections, functional tests, and calibrations for all DSTs as required per 40 CFR 265.195(c) and WAC 173-303-380. All records required above must be maintained for a period of five (5) years, unless otherwise specified by regulation, and be readily available upon request. All records required above must be dated and signed by the person performing the action specified by the inspection (i.e. daily inspections, functional tests, equipment calibrations). Electronically regenerated versions of original inspection records and testing are not acceptable unless accompanied by original, signed records.

Please complete and return the attached certificate of compliance to me by August 7, 1998. If you have any questions regarding this letter, please contact me at (509) 736-3031.

Sincerely,

Bob Wilson

Bob Wilson, Compliance Inspector
Nuclear Waste Program

BW:sb
Enclosure

cc: James Rasmussen, USDOE
William Adair, FDH
Steve Szendre, FDH
Brad Erlandson, LMHC
Mary Lou Blazek, ODOE
Administrative Record: TWRS

CERTIFICATE OF COMPLIANCE

As a legal representative of the U.S. Department of Energy, I certify, to the best of my knowledge, the completion of items requested by the Washington State Department of Ecology on July 8, 1998, with regard to the inspection of SY Tank Farm, located on the Hanford Site, Facility ID number WA 7890008967, as shown below.

COMPLIANCE STATUS

Corrective Measure	Date Due	Date Complete	Initials	Comments
#1	08/07/98			
#2	08/07/98			
#3	08/07/98			
#4	08/07/98			
#5	08/07/98			

Signature, USDOE-RL Representative Date